

Remarks

Applicants request reconsideration and allowance in view of the above amendment and the following remarks.

In the office action the species restriction was made final and claims 26, 29, 30, 32 and 33 were withdrawn from further consideration. The remaining claims were rejected under Section 103 (a) based upon a combination of references including Harada (US 5298780) and Okabe (5877527).

Claims 29 and 30 are amended to remove the limitation "masked" and there by read on the elected species.

Claim 21 is patentable over the combination of references because neither Harada nor Okabe shows or suggests setting the depth of the source regions at about the same level with the conductive gate material in the trench. With reference to Fig. 16 of Harada, it shows that the dopant source 15 for the source regions 5 is on top of the gate material. As such, the N⁺ diffusion from source 15 will extend below the level of the gate material as is shown in Fig. 16 of Harada. The source regions in Harada are not coplanar with the level of conductive gate material in the trenches.

Claim 21 has steps that are inconsistent with and not shown by the Harada process. That process mandates removal of the sidewall insulation layer from the trenches before the layer 15a of doped dielectric is deposited. See Fig. 11 where Harada removes the sidewall oxide 13 from the upper portions of the trenches. Claim 21 calls for leaving the sidewall isolation layer in place and on it depositing another isolation layer.

Harada has a further step not required by the invention. He oxidizes the polysilicon in the trench. See Fig. 10 and column 5 lines 20 – 25. With the invention, the polysilicon in the trench may be etched directly and it is not necessary to oxidize its upper portion before it is removed.

New claims 40 and 41 are also patentable over the art of record. The new claims specify undoped isolation layers for the sidewall isolation layer and for the layer that fills the tops of the trenches. The claims also call for ion implanting the substrate and diffusing the implant to form the source and body regions. Harada is contrary and does not show or suggest implanting to form the source regions. Instead Harada uses a doped isolation layer that fills the top of the trench and diffuses into the substrate to form the source regions. That is contrary to the claims. It would also be contrary to

Harada to change his technique of doping sources from a doped isolation layer to implanting sources. The sidewall oxide removal and doping from a doped isolation layer are integral steps in Harada and cannot be omitted with some suggestion in Harada.

In summary, the claims as amended are distinguished from the art of record and a notice of allowance is requested.

Respectfully submitted,



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